

### Remarks

In light of the above amendments and the following remarks, reconsideration of Claims 1-4 and their allowance are respectfully requested.

The specification has been amended to correct typographical and language/translation issues. The “M” and “T” effects have been defined as resonance or mesomeric effects and inductive effects respectively. These terms are well known to those skilled in the art as evidenced by the attached discussions in the textbooks “Organic Chemistry” by Morrison and Boyd and in “Physical Organic Chemistry” by Isaacs. The objected term “thiolate” has been deleted and “S-S” has been deleted so that the specification conforms to the claims.

In Claim 1, the misspellings noted by the Examiner have been corrected. Equal signs (=) have been replaced by the term “represents.” Definitions of  $R^1$ ,  $R^2$  and  $R^6$  have been amended to conform with the descriptions in the specification (p. 2 line 42 – p. 3 line 7; p. 4 lines 21-25). The groups –CN and –NO<sub>2</sub> have been deleted from  $R^3$ . The counter ion M+ (Li, Na, K, Rb or Cs), as described at p. 3 line 35, has been added to formula (IIIa2). The general narrative style has been amended to a more conventional format.

In Claims 2-4, equal signs (=) have been replaced by the term “represents” and the language has been slightly altered. The dependencies of Claims 3 and 4 have been changed.

Claim 8 has been cancelled.

Claims 1-4 are now in this case.

Claims 1-4 stand rejected under 35 U.S.C. § 112 second paragraph for being indefinite and for failing to point out and distinctly claim the subject matter of the invention. The grammatical and idiomatic errors pointed out by the Examiner, in addition to several others, have been corrected and it is believed the claims now meet the requirements of 35 U.S.C. § 112 second paragraph.

Claims 1 and 2 stand rejected under 35 U.S.C. § 112 first paragraph for not being enabled when R<sup>3</sup> is -CN and -NO<sub>2</sub>. As suggested by the Examiner, this rejection is overcome with the removal of -CN and -NO<sub>2</sub> from the definition of R<sup>3</sup>.

Claim 8 has been rejected based on double patenting of the "same invention" as claimed in claim 1 of US Patent 7,488,828. With the cancellation of Claim 8, this rejection becomes moot.

Claims 1-4 stand rejected on the grounds of nonstatutory obviousness-double patenting in view of US Patent 7,488,828. This rejection is overcome by the accompanying terminal disclaimer under 37 C.F.R. § 1.321(c).

The specification has been objected to with respect to several typographical and language issues. The spelling of "pyridine" at p 1 line 17 has been corrected. The redundant "the" has been deleted at p. 1 line 18. The "M" and "I" effects at p. 1 line 21 have been defined as resonance or mesomeric effects and inductive effects respectively. These terms are well known to those skilled in the art as evidenced by the attached discussions in the textbooks "Organic Chemistry" by Morrison and Boyd and in "Physical Organic Chemistry" by Isaacs. At p. 1 line 41, "bond" has been corrected to read "bound." The ambiguous term "thiolate" has been deleted.

The specification has also been objected to with respect to several technical issues. The Wittig or Horner precursors are defined on p. 2 as organic halides of formula aIII. To remove any ambiguity with respect to E represents S-S at p. 3 lines 25 and 32 and elsewhere, the term "S-S" has been deleted from the definition of E throughout the specification. The specification now conforms with the definition of E in Claim 1. The Examiner is correct that at page 8 the intermediate structures IV-3 and IV-4 which contain an additional OR<sup>1</sup> group, would not be present in the case of Wittig reagents prepared in aprotic solvent. However, such intermediates are indeed present in the case when Horner reagents are used in alcoholic solvents. One of ordinary skill in the art would realize that the intermediates IV are the kinds of compounds that can result from reaction paths B1 and B2. The kinds and amounts of intermediates IV would depend on the reagents and conditions employed.

In view of the above remarks and amendments, reconsideration of this application and its allowance are respectfully requested.

Respectfully submitted,  
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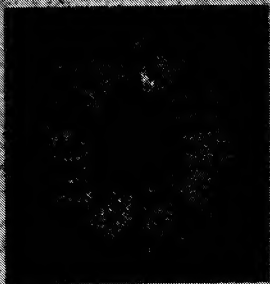
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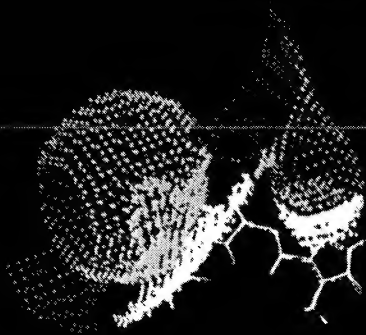
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# Physical organic chemistry



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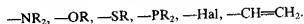
This is the benzene ring in the original Hammett systems and discussion will for the present center on benzenoid systems. Two basically distinct electronic effects may be generated by a substituent on a reaction site, and are discussed below.

#### 4.4.1 The resonance effect<sup>7a</sup>

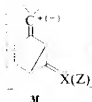
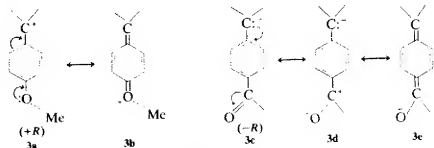
This is also known as the mesomeric effect, and is denoted *R*. Many substituents give rise to a perturbation which is greater when they are located *para* than when they are *meta*; this suggests the transmission mechanism is of a conjugative nature in which charge is relayed to alternate atoms. This effect is described here as a '+*R* effect' if it results in donation of electrons from substituent to reaction center and a '-*R* effect' if a withdrawal of electrons results. These effects would be characterized by negative and positive values of  $\sigma$ , respectively, so sign convention is slightly confusing.

In order to exercise a resonance effect, a substituent must possess a *p*- or  $\pi$ -orbital which is available to conjugate with the  $\pi$ -MOs of the aromatic system. Two situations are important.

- (a)  $\bar{X}$ - is a donor group and typically possesses an unshared electron pair or  $\pi$ -electrons on an atom directly attached to the ring. Examples are

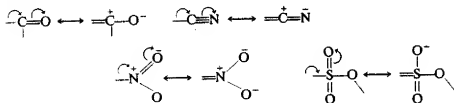


These groups are all capable of exerting a +*R* effect which stabilizes an acceptor center (e.g. a carbon bearing some degree of carbocation character) when in the *para* or *ortho* positions. The extreme situation is depicted by the VB structures, 3a, 3b. Little interaction between donor and



acceptor centers will occur if they are located *meta* since quinoid resonance structures analogous to **3b** and **3e** cannot be drawn and analogous structures (**3f**) are therefore of high energy and less important.

(b) Substituents Z have a  $\pi$ -acceptor center adjacent to the ring. Since no commonly encountered substituents possess vacant bonding *p*-orbitals, this means in practice groups which can act as electron acceptors by simultaneously releasing  $\pi$ -electrons to adjacent heteroatoms and whose VB contributing structures have a positively charged atom attached to the ring (**3c-e**). Common examples are



All such groups tend to accept electronic charge and stabilize donor centers (e.g. carbon bearing some degree of carbanion character adjacent to the ring), illustrated by contributing structure **3e**. Again, the strongest  $-R$  interactions occur when substituent and reaction centers are located *ortho* or *para* (**3e**).

It may be observed that there is no fundamental difference between these two situations; there is in each case a transfer of charge between two centers by conjugation and the differentiation into  $+R$  and  $-R$  effects merely depends upon which center we designate the substituent and which the reaction center.

#### 4.4.2 The inductive effect

The second type of perturbation evident from substituent constants results in the effect at the *meta* position being greater than that at the *para*. This is clearly observable in substituents such as  $-\text{NMe}_3$  (**4**) and  $-\text{CF}_3$  and depends for its strength upon proximity. This is called the inductive effect<sup>19,20</sup>, designated *I*;  $+I$  means electron-donating,  $-I$  electron-withdrawing. The basis of this electronic displacement is probably complex but originates in part from differences in electronegativity which cause

